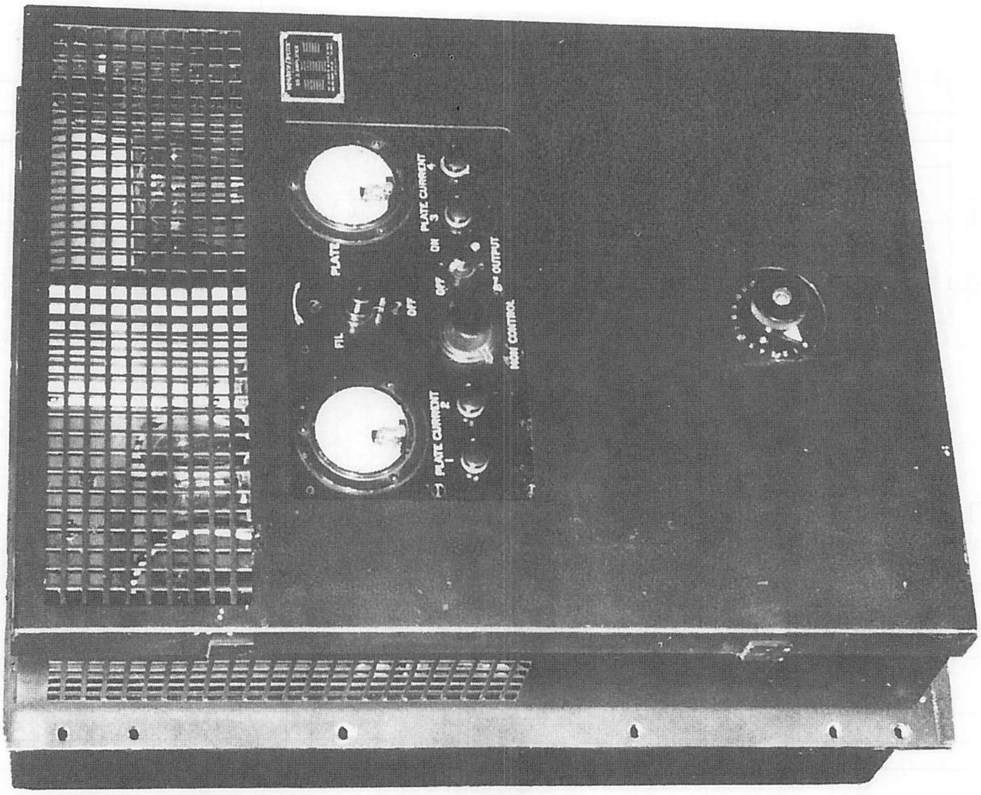
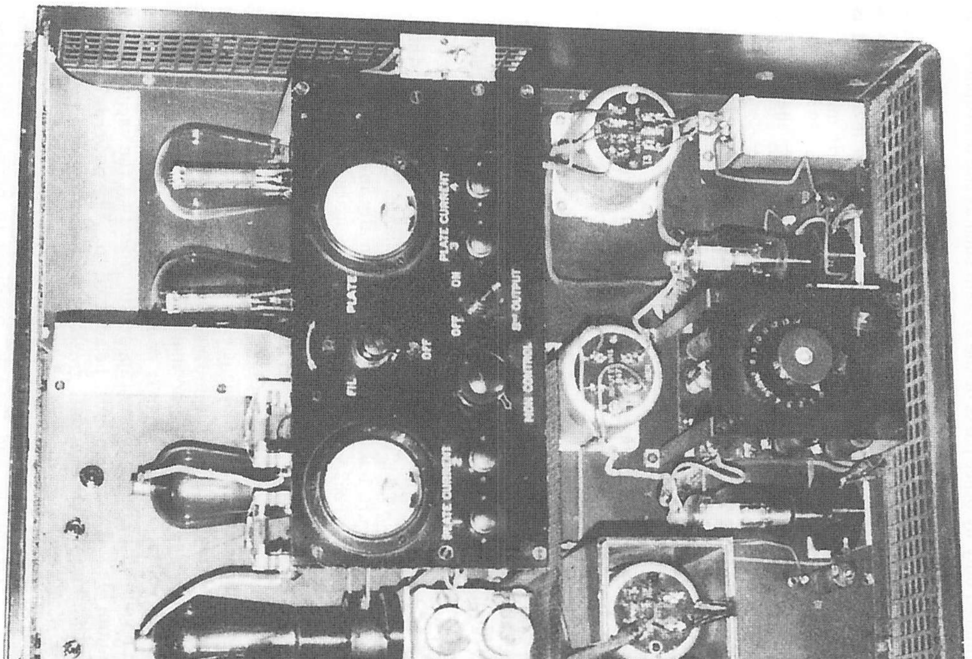
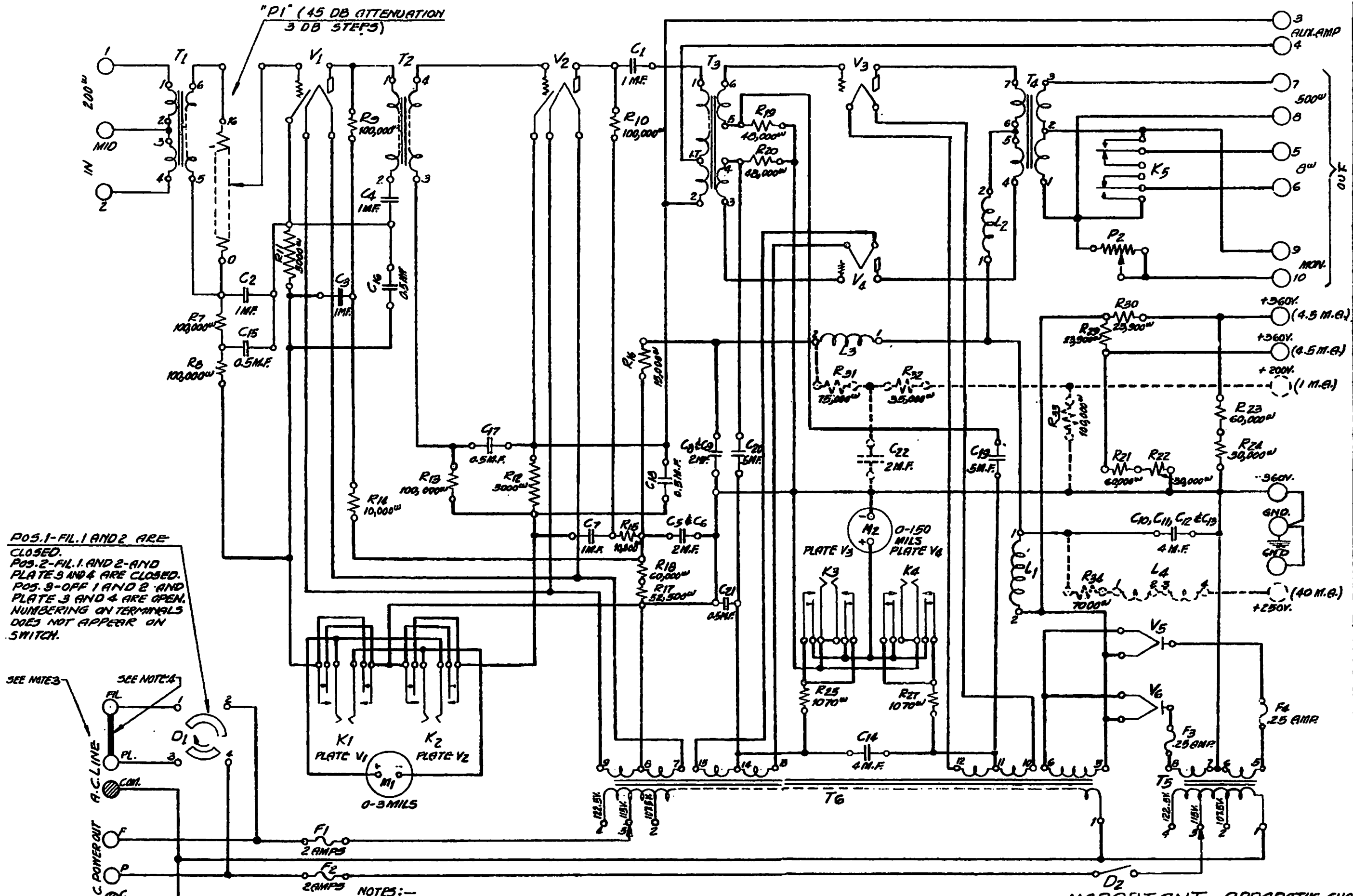

FIL
OFF
PLATE
OFF
ON
B+ OUTPUT
HUM CONTROL
PLATE CURRENT
1
2
3
4





NOTES:—
1. ◍ DENOTES GROUND SIDE OF LINE.
2. ON T5 & T6 LEAD IS NORMALLY CONNECTED TO TERM.3 FOR LINE VOLTAGES FROM 111V. TO 119V. FOR 102.5V. TO 111V. CONNECT TO TERM.2. FOR 119V. TO 127.5V. CONNECT TO TERM.4.
3. A.C. LINE SHOULD NORMALLY BE CONNECTED TO TERMS. COM. & FIL.
4. REMOVE STRAP BETWEEN TERMS. FIL. & PL. WHEN MASTER CONTROL SWITCH OUTSIDE OF AMPLIFIER IS USED.

IMPORTANT— APPARATUS SHOWN DOTTED IS THE 706-A FILTER FORMS PART OF THE 59-B AMPLIFIER. THE 59-A AMPLIFIER IS SIMILAR EXCEPT THE DOTTED APPARATUS (706-A FILTER) IS NOT SUPPLIED.

DESG.	APPARATUS
C1 TO C13 INCLUSIVE	221-A CONDS.
C14	137-A COND
C15 TO C21 INCLUSIVE	141-B "
D1	H.& H. SWITCH #80178
D2	CUTLER HAMMER DOOR SWITCH #7246 LESS PLATE
F1, F2	CLEARSITE PLUG FUSE
F3, F4	62-B FUSE
K1 TO K4 INCLUSIVE	92-AL KEYS
K5	272-A KEY
L1	137-A RETARD. COIL
L2	136-A " "
L3	148-D " "
M1, M2	WESTON #301 FLUSH TYPE MILLIAMMETER METAL CASE
P1	706-A POTENTIOMETER
P2	KS-6692 200ω ITEM #1
R7 TO R10 INCLUSIVE	38-W RESISTANCES
R11, R12	18-HG "
R13	38-W RESISTANCE
R14, R15	38-AA RESISTANCES
R16	38-C RESISTANCE
R17	38-S "
R18, R21, R23	38-BC RESISTANCES
R19, R20	38-A "
R22, R24	38-AB "
R25, R27	18-HA "
R29, R30	W.L. RESISTANCE TYPE "B" TAB TERMINALS 23,900 OHMS RESIS.
T1	261-A INP. TRANSF.
T2	247-L " "
T3	247-K " "
T4	139-D OUT. "
T5	316-A TRANSF.
T6	317-C "
V1, V2	262-A VACUUM TUBE
V3, V4	252-A " "
V5, V6	253-A " "
706-A FILTER (SEE IMPORTANT NOTE)	
C22	223-B COND.
L4	134-B RETARD. COIL
R31	38-AR RESISTANCE
R32	38-AW "
R33	38-W "
R34	85-A "

	APP'D
TRACED FROM B.L. DWG. ESO-335607 ISSUE B WITHOUT CHANGE J.D.K.	
ISSUE: 1 7-29-32 ON D2, "LESS PLATE" WAS ADDED. CORRECTED TO AGREE WITH HAWTHORNE DWGS. A-151937 ISSUE: 4 & A-161678 ISSUE: 4 J.D.K. H.J.W.	M.B
ISSUE: 2 2-16-33 LEAD FROM TERM. 1 OF T4 WAS NOT CONNECTED TO LEAD FROM P2. A.M.	M.B.
ISSUE: 3 4-26-33 WIRE FROM R20 WAS NOT CONNECTED TO -360 V.	M.B.
ISSUE: 4 12-26-33	M.B.

ASX-5298 WIRING DIAGRAM
ASSOCIATED DRAWINGS

59-A & 59-B AMPLIFIERS

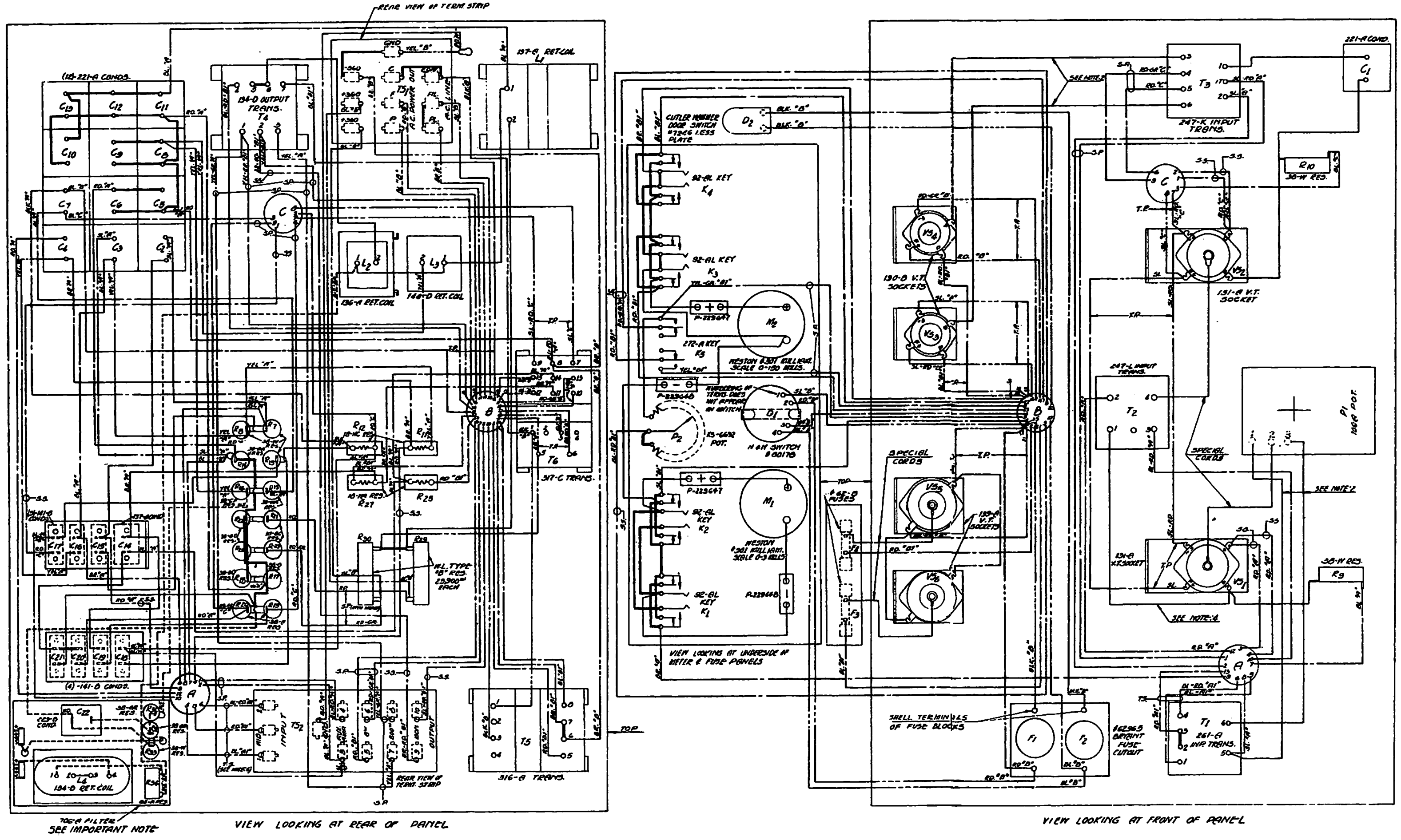
SCHEMATIC

WESTERN ELECTRIC SOUND SYSTEMS
ELECTRICAL RESEARCH PRODUCTS INC. NEW YORK
DRAWN BY J.D.K. DATE 7-7-32
CHECKED BY H.J.W. DATE 7-14-32
APP'D
SCALE-

ASO-3764

ASO-3764

TRACED FROM B.L. DWG. ESB-338604 ISSUE 11 WITHOUT CHANGE. J.O.K.	
ISSUE 1 7-29-32 ON D2, "LESS PLATE" WAS ADDED CORRECTED TO AGREE WITH HAWTHORNE DWGS A-161614 ISSUE 10 & A-161077 ISSUE 9 J.O.K.	M.B.
ISSUE 2 2-16-33	M.B.



706-A FILTER
SEE IMPORTANT NOTE

VIEW LOOKING AT REAR OF PANEL

VIEW LOOKING AT FRONT OF PANEL

NOTES:-

ALL B.B.E. WIRE IS PER A-300,001

WIRES SHOWN THIS ------- ARE #16 A.W.GA. PER D-93974

" " " ━━━ " STRAPS PER P-26997

" " " ——— " #16 A.W.GA. B.B.E. WIRE OPEN FORMED (BLACK)

" " " —·— " #20 " " " " IN CABLE

" " " —··— " #14 " " " " OPEN FORMED (BLACK UNLESS OTHERWISE SPEC.)

" " " —···— " #16 " " " " IN CABLE

" " " S.S. " #20 A.W.GA. B.B.E. WIRE, SHIELDED SINGLE, SHIELDED PER KS-1955 IN CABLE.

" " " S.P. " #20 A.W.GA. B.B.E. WIRE, SHIELDED PAIR, SHIELDED PER KS-1955 IN CABLE.

" " " T.S. " #20 A.W.GA. B.B.E. WIRE TRIPLE SHIELDED, SHIELDED PER KS-1955.

" " " S.P. " #20 A.W.GA. B.B.E. WIRE SHIELDED PAIR SHIELDED PER KS-1955 (OPEN FORMED)

" " " - - - - " FURNISHED AS PART OF 706-A FILTER.

T.P. DENOTES TWISTED PAIR.

LETTERS "A", "A1", "B", "B1", & "C" DENOTE CABLE IN WHICH WIRE IS RUN.

NOTE: Ⓐ Ⓑ & Ⓒ ARE HOLES IN PANEL WIRES IN EITHER FRONT OR BACK VIEWS ENDING AT A HOLE THUS: Ⓐ ARE CONTINUED IN THE OTHER VIEW AT THE CORRESPONDING HOLE AND WIRE.

NOTES:

1. ON T5 AND T6 LEAD IS NORMALLY CONNECTED TO TERMINAL 3 FOR LINE VOLTAGES FROM 111V. TO 119V. FOR 102.5V. TO 111V. CONNECT TO TERM. 2. FOR 119V. TO 127.5V. CONNECT TO TERMINAL 4.
2. THESE WIRES SHALL BE OPEN FORMED, RUN DIRECTLY AND AS FAR AWAY FROM OTHER WIRES AND METALLIC SURFACES AS POSSIBLE.
3. SPECIAL CARE SHALL BE USED TO PREVENT LOOSE SOLDER FROM LODGING INSIDE THE AMPLIFIER. AFTER THE WIRING IS COMPLETED, THE AMPLIFIER SHALL BE TURNED BOTTOM SIDE UP AND ANY LOOSE SOLDER REMOVED.
4. THIS WIRE SHALL BE RUN FROM THE "P" TERM. OF VS1 HORIZONTALLY TO WITHIN ½" OF THE PANEL, THEN VERTICALLY TO A HORIZONTAL PLANE PASSED THRU THE ℄ OF TERM. 1 ON T2, OVER HORIZONTALLY TO T2, UP TO THE LEVEL OF TERMINAL 1 ON T2 AND OVER TO THE TERMINAL.
5. ALL SKINNERS SHALL BE AS SHORT AS POSSIBLE BUT LONG ENOUGH TO AVOID A STRAIN ON THE SOLDERED CONNECTIONS.
6. THE LEADS TO THE INPUT TERMINALS ON TS2 SHALL BE TWISTED AND SHIELDED AS CLOSELY TO THESE TERMINALS AS POSSIBLE.
7. UNGROUNDED ENDS OF SHIELDING TO BE FINISHED AS SPECIFIED ON A-162016. ALL SHIELDING TO BE CONNECTED TOGETHER AND GROUNDED TO A COMMON GROUND. CONNECTIONS TO SHIELDING TO BE FINISHED AS SPECIFIED ON A-137496. GROUNDED CONNECTIONS TO BE MADE WITH #20 A.W.GA. B.B.E. WIRE INSULATED WIRE.
8. IN THIS AMPLIFIER THE VACUUM TUBE SOCKET TERMINALS OF VS1 AND VS2 ARE USED FOR CONNECTIONS AS FOLLOWS:-
   - "G" — CATHODE
   - "F-" AND "F+" — A.C. FILAMENT
   - "P" — PLATE
9. ALL WIRES TO BE FREE FROM KINKS AND UNNECESSARY LOOPS SHALL BE AVOIDED.

IMPORTANT

THE CIRCUIT ABOVE IS FOR THE 59-B AMPLIFIER.

THE 59-A IS SIMILAR EXCEPT THAT THE 706-A FILTER IS NOT SUPPLIED.

A50-3764 SCHEMATIC
ASSOCIATED DRAWINGS

59-A & 59-B AMPLIFIERS

WIRING DIAGRAM

WESTERN ELECTRIC SOUND PROJECTOR SYSTEMS

ELECTRICAL RESEARCH PRODUCTS INC. NEW YORK

DRAWN BY J.O.K. DATE 7-6-32

CHECKED BY K.L.R. DATE 7-14-32

SCALE

ASX-5 2 9 8

ASX-5 2 9 8

0. REASON FOR REISSUE

0.1 To clarify Figure 3.

1. Associated Drawings

ASO-3764, Schematic, 59-A and 59-B Amplifiers
ASX-5298, Wiring Diagram

2. Description

2.1 For tabulated information refer to E.E. "Amplifiers, General", F.R. 4.03.

2.2 The 59 type Amplifier is a rack-mounted three stage, all AC, Amplifier. It is arranged so that a 57-A Amplifier may be used, if required, in parallel with the final stage. This amplifier requires a 262-A Vacuum Tube for each of the first two stages and two 252-A Vacuum Tubes for the push pull output. Two 253-A (mercury vapor) Vacuum Tubes are employed as a full wave rectifier in conjunction with a filter for supplying plate potentials to the three stages of amplification as well as plate energy at 360 volts (4.5 mils.) to each of two external terminals. These terminals are intended for connection to preliminary amplifiers when such are used. In addition, the 59-B Amplifier contains a 706-A Filter to supply energy to a 10-A Radio Receiver at 200 volts (1.0 mil.) and 250 volts (40 mils.).

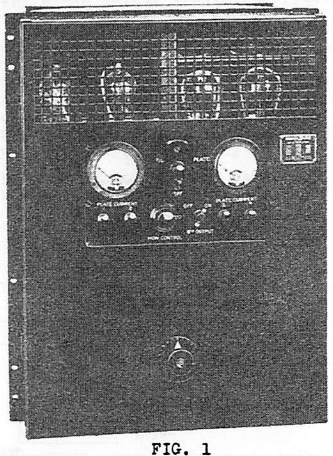


FIG. 1
59-A AMPLIFIER - FRONT VIEW

2.3 The amplifier possesses a total gain of 85 db. A potentiometer in the input to the first stage provides a gain regulation of 45 db in steps of 3 db. A volume control is provided in the monitoring circuit whereby the energy of a 16 ohm monitoring loudspeaker may be regulated over a range of 20 db. A midtap on the primary winding of the input transformer provides for operation of the amplifier with a double button carbon transmitter and for reduction of noise in the input circuit by grounding the mid-point of the primary of the input transformer, if desired. It is sometimes advantageous to ground the mid-point of the input transformer as an aid to the elimination of noise. However when the 59-B Amplifier is used with the 10-A Radio Receiver, one output terminal of which is grounded, the transformer mid-point must not be connected to ground. A milliammeter and a push-type key connected in the plate circuits of the first two stages provide a means for measuring the individual plate currents of the 262-A Vacuum Tubes. Two similar keys and a milliammeter are connected in the circuit of the last stage in such a manner that the meter normally indicates the combined plate currents of the 252-A Vacuum Tubes. The plate current of either 252-A Vacuum Tube may be measured separately on the meter by operating the proper key.

2.4 The required power supply is 102.5-127.5 volts, 50 to 65 cycles AC. Taps are provided on the power transformers (T_5 and T_6) to compensate for voltages within these limits. (See ASO-3764.) The application of AC power to the amplifier is controlled by a three position snap switch having "OFF", "FILAMENT" and "PLATE" positions.

2.5 Equipment which may require replacements or inspection, such as fuses and vacuum tubes, is mounted on the front of the panel and is accessible by opening a hinged cover. Opening the front cover automatically removes power from the primary circuit of the high voltage plate transformer.

2.6 The terminal arrangement of the amplifiers is shown in Fig. 2. Access to these terminals for external connections is gained by removing the rear cover which is held by six screws. Disconnect the power before doing this because no safety switch is associated with the rear cover.

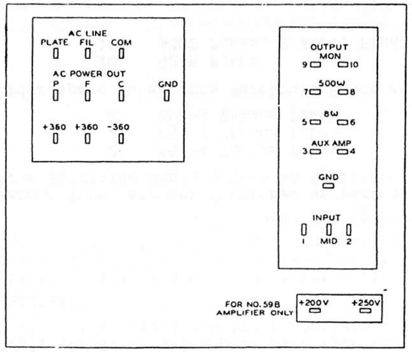


FIG. 2
TERMINAL ARRANGEMENT OF
59-A AND 59-B AMPLIFIER

2.7 If increased output capacity is required, one, two or three 57-A Amplifiers may be used in conjunction with the 59 type Amplifier. A maximum of three 57-A's may be operated in parallel with the power stage of the 59 type, with a high quality of transmission being maintained up to 6000 cycles. If uniform frequency transmission up to 10,000 cycles is required, not more than one 57-A Amplifier should be used in this way.

3. Installation

3.1 Mount the amplifier on a 101 type Rack and connect the "INPUT" terminals #1 and #2 to the source to be amplified. The impedance of this circuit should be 200 ohms. The center tap of the input transformer is wired to the input terminal marked "MID". This may be used for a ground or battery connection where it is desired to operate a double button carbon microphone such as the 387 Transmitter directly into the amplifier without an external repeating coil. Connect terminal marked "GND" to the system ground.

3.2 If one or more 57-A Amplifiers is to be installed in conjunction with the 59 type Amplifier, connect terminals #3 and #4 (marked "AUX-AMP") of the 59 type to the input terminals. If each amplifier is to supply a separate group of loudspeakers, connect each output accordingly with the output of the 59 type Amplifier connected at terminals #5 and #6 (8 ohm load) or #7 and #8 (500 ohm load) as the case may be. If however, it is necessary to connect the output circuits of the amplifiers in parallel, these connections must be made in such a manner that terminal #7 of the 59 type is connected to terminal #3 of the 57-A Amplifier. This will permit the combined amplifiers to feed one group of loudspeakers. Connect terminals #9 and #10 to the speech coil terminals of a low impedance monitoring loudspeaker.

3.3 Connect the "AC LINE" terminals marked PL and COM to the 110 volt AC power supply. The FIL terminal will receive its supply through the strap connecting it to the PL terminal. Connect the grounded side of the line to the terminal marked "COM" (nickel finished screw).

Connect the "AC POWER OUT" terminals marked "P","F" and "C" to the similarly marked terminals of any 57-A Amplifiers or other associated AC operated equipment which is to be controlled by the power switch of the 59 type Amplifier. Connect either of the terminals marked "+360" and the terminal marked "-360" to the corresponding terminals of one or two preliminary amplifiers. For the 59-B Amplifier only, connect the terminals marked "+250" and "+200" to the corresponding terminals of the 10-A Radio Receiving Set. Reconnect the flexible leads to the primaries of T_5 and T_6 as required (see Sect. 2.4).

3.4 In the event that power to the amplifier is to be remotely controlled by means of a sequence switch or relay arrangement, the strap which connects the "FIL" and "PLATE" terminals of the amplifier should be removed and the "FIL","PLATE" and "COM" terminals connected to the external switching circuit in such a manner that the first switching operation energizes the "FIL-COM" circuit of the amplifiers, and the second operation energizes the "FIL-COM" and "PLATE-COM" circuits. Keep the power switch D_1 of the amplifier in the "PLATE" position.

3.5 If it is desired not to have the power switch D_1 in the circuit, remove the PL to FIL strap from the AC line terminals as these will not be used, and connect the power leads from the remote control switches to the "AC POWER OUT" terminals. An arrangement of this kind is shown in Fig. 3 where the power to the 59 type Amplifier is delivered from a relay (A-7) which is actuated by low voltage AC controlled by the power supply switch on the 10-A Radio Receiver. That portion of the power supply intended for the "P" terminal of the amplifier is routed through the time delay relay (TDR) which is set to operate 30 seconds later than the supply relay.

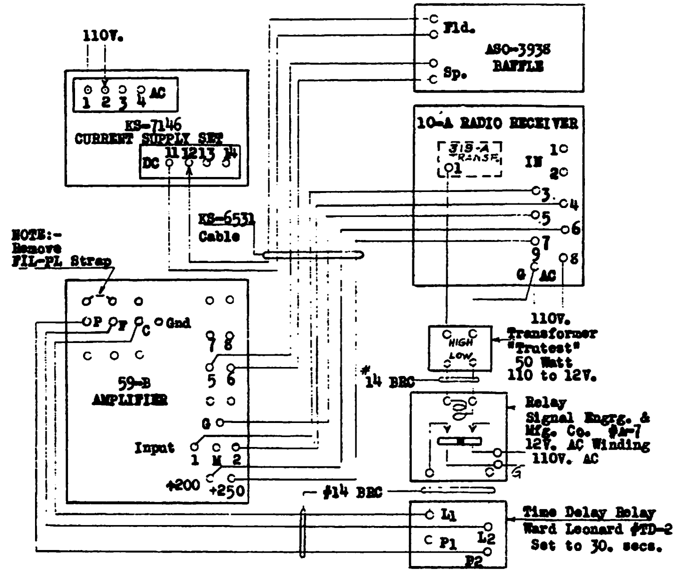


FIG. 3

4. Operation

4.1 Install vacuum tubes as required (see drawings). Operate the power switch to the "FIL" position and allow at least 30 seconds for the tubes to heat.

CAUTION: If the 253-A Vacuum Tubes are being operated for the first time or if they have been removed previously from the amplifier or shaken up the filaments must be allowed to heat up for at least ten minutes before the high voltage is applied. This precaution is necessary in order that any mercury which had adhered to the filaments while the tube is removed from the amplifier will be evaporated before the plate potential is turned on. The 59-A or 59-B Amplifier is designed for normal operation at room temperatures between 32 degrees and 110 degrees F. In case it is necessary to operate the amplifier in temperatures below 40 degrees F., the power switch should be allowed to remain in the "FIL" position until the 253-A Vacuum Tubes become warm to the touch. This may require several minutes.

Operate the power switch to the "PLATE" position which places the amplifier in an operating condition. If the 59-A or 59-B Amplifier is operated by a remotely controlled switch or relay, the power switch on the 59-A or 59-B Amplifier should be set in the "PLATE" position and the power applied by the remote device following the same sequence and time factor as listed above.

4.2 With the 59-A or 59-B Amplifier in the operating position, the right hand plate current meter, M_2, should indicate the combined plate currents of the two 252-A Vacuum Tubes, and should be between 105 and 135 milliamperes. In order to obtain individual plate current readings of these tubes, it is necessary to operate the proper push-type key (marked "3" or "4"). The meter should then indicate between 50 and 70 milliamperes. If the plate current of either 252-A Vacuum Tube is outside these limits, the tube should be replaced. The left hand meter, M_1, is used for obtaining the plate current readings of either of the 262-A Vacuum Tubes, VT and VT . It is necessary to operate the associated key marked "PLATE 1" or "PLATE 2". The meter, in either case, should indicate between 1.9 and 2.5 milliamperes. If the plate current of either 262-A Vacuum Tube is outside these limits, the tube shall be replaced.

4.3 When the amplifier is in operation, a soft blue glow is evident in the upper part of the 253-A Vacuum Tubes, and as the tubes age this glow gradually extends to the lower part of the bulb and the color becomes lighter until the whole bulb glows with an intense blue light. This effect may be used to advantage as a rough indication of the condition of the 253-A Vacuum Tubes. During the early part of this aging period, flickering of the blue glow may be observed. As it is a natural phenomenon at a certain stage in the tube life, it does not denote a defective tube and should not be mistaken for such.

4.4 Operation of the key marked "8W OUTPUT" connects or disconnects the low impedance output.

4.5 When a low impedance monitor speaker is connected to this amplifier, its volume regulation is obtained by the operation of the 200 ohm Rheostat marked "MON. CONTROL".

5. Maintenance

5.1 If the amplifier fails to function when placing it in operation, the following points should be checked. With the power switch or remote control operated to the "FIL" position, the filaments of all the vacuum tubes should light. If any individual tube filament does not light, that tube should be replaced with a new one. If the filament of the new tube does not light, the wiring between the tube socket and the filament transformer "T6" should be inspected. If the filaments of all the tubes do not light, examine fuse "F1". This should be a 2 ampere plug type fuse. If the fuse is satisfactory the connections to the AC power supply should be inspected and the supply checked. If the filaments light but the amplifier fails to function with the power switch operated to the "PLATE" position, the plate current supply should be inspected. With the absence of any blue glow in one of the rectifier tubes, "V5" or "V6", its corresponding fuse "F3" or "F4" should be examined. If there is not any blue glow in both of the rectifier tubes, the fusing of the primary side of the plate power transformer "T5" should be inspected. This fuse, "F2", should be a 2 ampere plug type fuse. Further difficulty after replacement of tubes will require a complete check of the wiring.

6. Merchandising

6.1 The 59-A or 59-B Amplifier is not a stock item and is supplied only on special approval from Operating Headquarters. It is available on an "as ordered" basis. Order from Operating Headquarters as:-

1 59-A (or 59-B; see Sect. 2.2) Amplifier

6.2 Vacuum Tubes are not furnished as part of the amplifier and should be ordered from Operating Headquarters as follows:-

2 252-A Vacuum Tubes
2 253-A Vacuum Tubes
2 262-A Vacuum Tubes

6.3 Order spare fuses from Warehouse Stock as follows:-

10 62-B Fuses
10 #802 Fuses, 2 Amp., Plug, Buss